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environmental assessment

site selection and operation
gas treatment plant and distribution facility

january 1985

COMPLETED

28.

ORIGINAL

GATEWAY
FOUNTAIN AVENUE LANDFILL

NATIONAL RECREATION AREA / NEW YORK

ENVIRONMENTAL ASSESSMENT

SITE SELECTION AND OPERATION
GAS TREATMENT PLANT AND DISTRIBUTION FACILITY
FOUNTAIN AVENUE LANDFILL

GATEWAY NATIONAL RECREATION AREA
Brooklyn, New York

United States Department of the Interior / National Park Service

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INTRODUCTION

Gateway National Recreation Area includes the Pennsylvania Avenue and Fountain Avenue landfills, located in Brooklyn along the northwestern shore of Jamaica Bay. The Pennsylvania Avenue site, inactive since 1979, is between Fresh Creek and Hendrix Creek. The Fountain Avenue site is just to the east between Hendrix Creek and Spring Creek (sometimes known as Old Mill Creek). Both sites are bounded on the north by the Belt Parkway and are within the Jamaica Bay unit of the national recreation area.

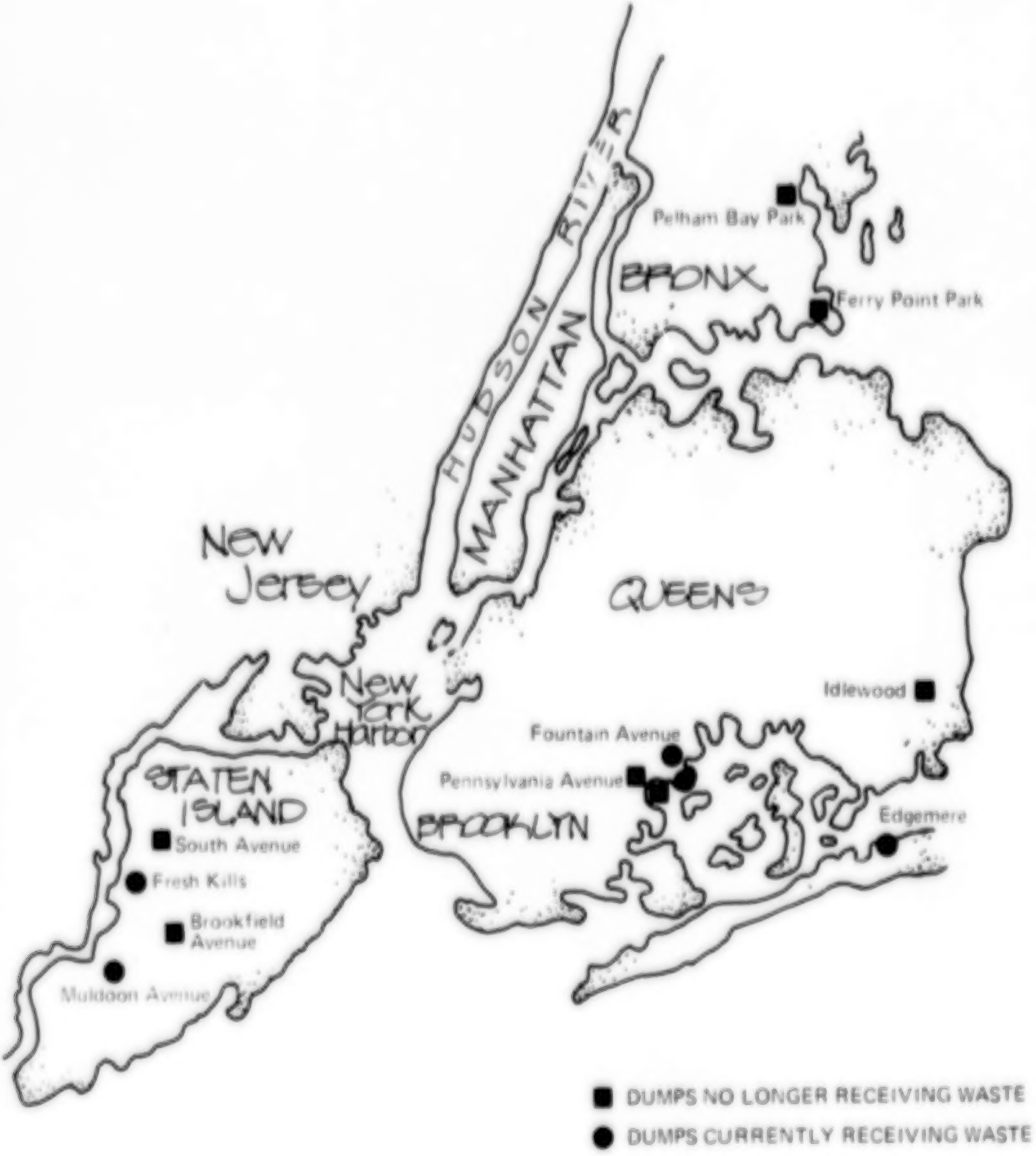
The Fountain Avenue landfill is primarily a putrescible (biodegradable organic) refuse landfill. It is probably the second largest refuse truckfill in the United States, surpassed in area and volume only by the 2,700-acre Fresh Kill landfill on Staten Island, which is barge-fed, and the 1,200-acre Puente Hills landfill in Los Angeles County, California.

Filling at the Fountain Avenue landfill began in 1961. Since the late 1970s, the site has accepted approximately 5,000 tons per day of mixed municipal wastes, mainly from communities in south and southeastern Brooklyn and southern Queens. This has represented nearly 30 percent of New York City's solid waste in those years.

In March of 1974 a memorandum of understanding was signed by New York City and the National Park Service calling for transferal of the two landfill sites to the Park Service and giving the city until December 31, 1980, to complete landfill operations at Pennsylvania Avenue and until December 31, 1985, to complete operations at Fountain Avenue, with 120 days to turn over the site to the Park Service following completion of filling. The deed for the property was subsequently conveyed to the Park Service. Later, in 1980, a city-requested amendment was approved by the Park Service that permitted an extension of operations of both landfills until December 31, 1985, or the date when the final design configuration was reached, whichever came first. The city was also granted a two-year additional period to prepare both sites for turnover.

Also in 1980 the city requested an amendment to the memorandum postponing turnover of Fountain Avenue landfill until December 31, 2005, to allow 20 years for gas extraction. This request was determined to be outside Park Service authority, and the extension was denied. In 1982 Public Law 97-232 (see appendix A) authorized the Park Service to permit the city to extract and process the gas from the Fountain Avenue landfill for sale, subject to some provisions and assuming this proved feasible. A 12-month permit for the gas testing was issued to the city by the Park Service on January 10, 1983.

In April 1984 the city's "developers," Getty Synthetic Fuels, Inc. (GSF), and Methane Development Corporation (MDC), a subsidiary of Brooklyn Union Gas Company, released a report called "Fountain Avenue Scope of Project" to the city and the Park Service. This report documented the feasibility of the extraction project, proposed treatment facility ("plant") location alternatives, and described the technical aspects of the project and its environmental considerations.



LOCATIONS OF NEW YORK CITY MUNICIPAL LANDFILLS

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NEED FOR THE PROPOSAL

The 1979 National Environmental Policy Act, Council on Environmental Quality regulations, and Department of the Interior and National Park Service policies require the preparation of environmental assessments for all proposed NPS actions not categorically excluded, except those for which a decision to prepare an environmental impact statement has already been made. The purpose of preparing an environmental assessment is to determine whether the proposed action may or will have a significant impact on the quality of the human environment and require the preparation of an environmental impact statement.

Because two of the alternative sites for the Fountain Avenue treatment plant (including the preferred location), as well as the distribution network and a service road, were identified on NPS lands in the GSF/MDC scope of project report, this environmental assessment has been prepared to aid in final site selection for the facility and its operation. This assessment is based on the requirement that the permits listed in appendix B be obtained.

HISTORICAL BACKGROUND

LANDFILL GAS TECHNOLOGY

Landfill operations began evolving from open dumps into sanitary landfills in the post-World War II era as the environmental consciousness of the citizenry increased. Scientific and technical literature indicates that although it was known that methane and carbon dioxide were generated by the anaerobic decomposition of refuse, it wasn't until the late 1960s and early 1970s that any widespread experimentation and research was directed toward a better understanding of the process.

As more and more solid waste was deposited in sanitary landfills, the generation of landfill gas became both a nuisance and a potential blessing. Uncontrolled, the generated landfill gases follow the path of least resistance and migrate through the landfill into the atmosphere. Although methane and CO_2, the primary elements of landfill gas, are odorless, very small amounts of other hydrocarbon trace elements are carried along with the gas and create an odor problem under certain circumstances.

By the early 1960s the underground migration of landfill gas into adjacent residential, industrial, and commercial areas began to be recognized as a serious problem. The constant emission of these gases caused numerous problems related to pollution, increased odor, fire, explosion, and the destruction of nearby vegetation.

With the advent of the national energy crisis of 1973, landfill gas began to be recognized as a viable alternate energy source, and the methane recovery industry was created. As oil prices began to skyrocket, the financial incentives were present to invest the manpower and capital resources necessary to recover and purify landfill gas, thus creating an acceptable energy source. At that time, Getty Synthetic Fuels' predecessor (NRG Nufuel Company, subsequently Reserve Synthetic Fuels, Inc.) designed, built, and operated the world's first methane recovery plant from sanitary landfill. This plant began operation in 1975 at the Palos Verdes landfill in southern California and still operates successfully.

From that modest beginning, Getty Synthetic Fuels' today operates a total of ten landfill gas facilities in the United States and has four more under construction. The company's largest and most recent high Btu facility is located at the world's largest landfill, Fresh Kills, owned by the city of New York. That plant, which began operation in July 1982, provides enough pipeline quality gas to meet the equivalent energy needs of approximately 15,000 homes.

The Fresh Kills project is the result of a joint venture between Getty Synthetic Fuels, Inc., and Methane Development Corporation, a wholly owned subsidiary of Brooklyn Union Gas. It is the first large-scale methane recovery facility on the East Coast and one of several that will be developed jointly by GSF and MDC--including Fountain Avenue.

FOUNTAIN AVENUE EXTRACTION PROJECT

Landfilling operations at the Fountain Avenue site commenced in December 1961 at a fill rate of approximately 800,000 tons per year. Beginning in 1970 the fill rate increased to approximately 1.5MM tons of refuse per year. Since 1975 the rate has been approximately 2.0MM tons of refuse per year, which will be maintained through 1985. Although the city of New York operates the landfill, in November 1974 the city deeded the site to the Park Service for eventual use in the Gateway National Recreation Area. The city retained the exclusive right of possession, use, and occupancy for landfill purposes through December 31, 1985.

At the time of the transfer in 1980 the city began negotiating with the Park Service to secure for the city the rights to the landfill gas. These negotiations culminated in legislation by the U.S. Congress, which gave the city of New York the gas development rights. However, the Park Service will receive 50 percent of any royalty that the city receives from the development and must use this money to develop and improve the facilities at Gateway. (It is expected that gas extraction will be economically viable for a period of 20 to 30 years after landfilling ceases.)

In August 1982 the NYC Board of Estimate passed a resolution authorizing the city to contract with Getty Synthetic Fuels and Methane Development Corporation to evaluate, recover, and utilize the landfill gas at Fountain Avenue landfill in Brooklyn. Investigative work at the landfill has commenced by the developers, and the contract between the city and the developers has been finalized.

DEVELOPMENT APPROACH

GSF/MDC is developing the methane recovery system at the Fountain Avenue landfill in two phases. The first phase, consisting of on-site testing and evaluation, has been completed except for the final review and updating that will be required as a result of landfilling since completion of testing. The second phase will consist of design and construction of the collection, processing, and delivery facilities.

To date, phase I has involved on-site static and dynamic testing by a specially trained and equipped landfill test crew to determine gas production rates, gas composition, collection efficiency, withdrawal vacuum requirements, and related information. Concurrently, aerobic refuse samples taken from test wells have been subjected to a laboratory analysis to determine the gas reserves available in the landfill and the expected longevity of production. Phase I will culminate in a series of feasibility studies, including the technical, marketing, environmental, and economic aspects of the proposed project. These feasibility studies will be used to determine if the project should proceed to phase II.

Phase II will include a detailed plant design for the predicted gas volumes. The selected plant site will be prepared, and the remaining gas collection lines installed. In addition, an important part of the phase II activities will be the acquisition of all required permits. Finally, procurement of plant components will be initiated and on-site construction will commence. Plant startup and operation will follow a complete and thorough checkout. The actual phase II development time for the Fountain Avenue project will take approximately 24 months. Monthly reports will be submitted to the NYC Department of Sanitation reflecting the actual status of the project.

For all sites where landfill gas testing programs have previously been conducted and all sites under development, the developers have obtained all necessary permits, approvals, and environmental impact statements or negative declarations, as appropriate, and have complied with all applicable laws, ordinances, rules, and regulations. The same will apply at Fountain Avenue.

GSF's entire methane gas recovery program has been virtually accident-free since its inception eight years ago. No fatalities or major disabling injuries have been experienced in the program and strict adherence to OSHA standards is maintained. All GSF facilities contain professional alarm systems for fire, hazard, and intrusion protection that result in automatic shutdown of the facility. Periodic testing is conducted to ensure that GSF employees operate in a safe environment.

ALTERNATIVES

The GSF/MDC scope of project report identified five alternative sites, A-E (see Treatment Plant Site Alternatives map). Only sites D and E are on NPS property. An additional alternative site is nearby site F, presented as an option by the National Park Service. A plan of operations has been submitted to the Park Service, including a plan showing the initial network of collection pipes and wellheads and the existing service road on the landfill. This road could also be utilized by the public for access to recreational activities and by the Park Service for operational and maintenance needs.

NO-ACTION ALTERNATIVE

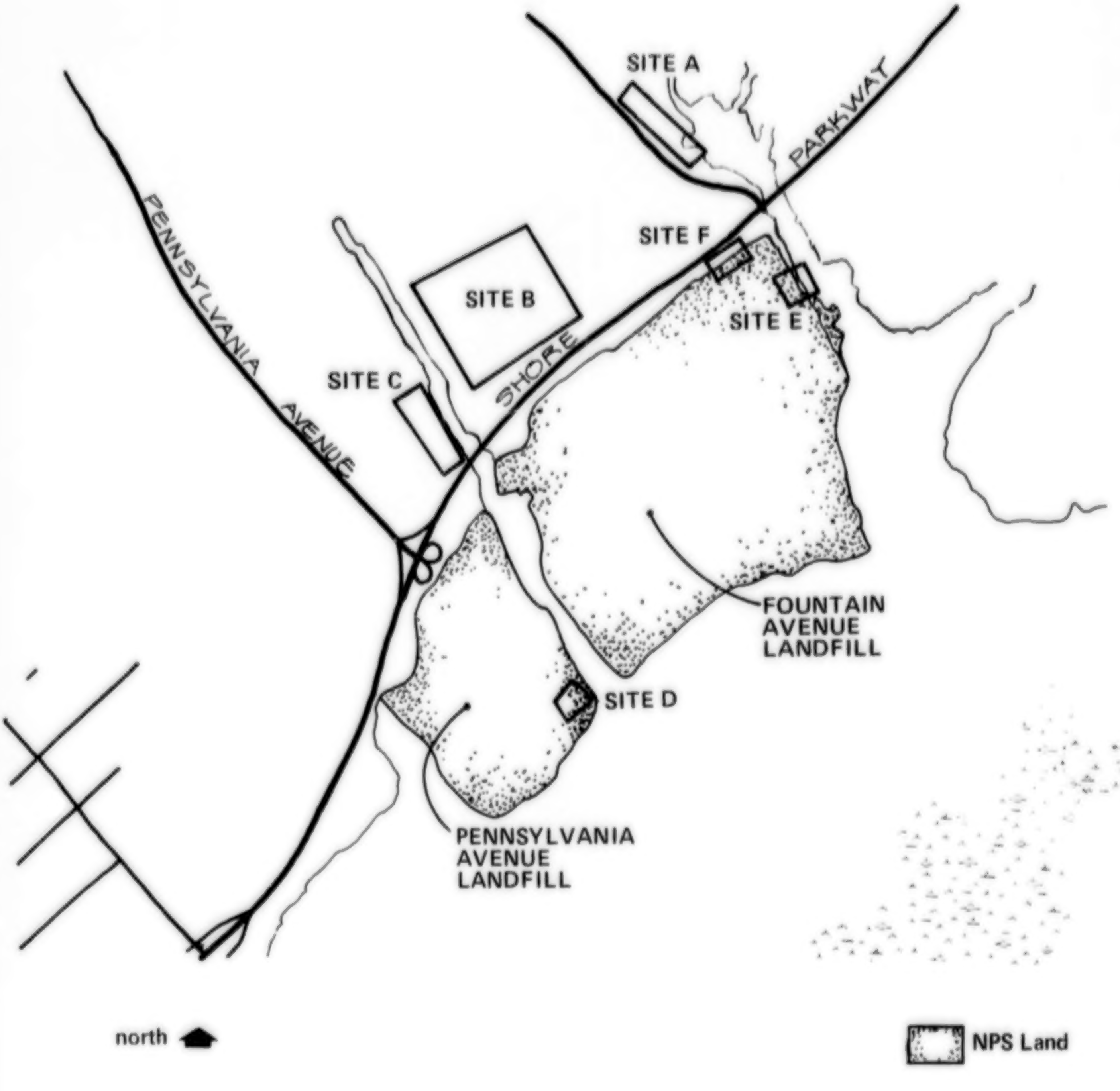
The intent of Public Law 97-232 is to provide for the extraction, treatment, distribution, and commercial sale of landfill gas from the Fountain Avenue landfill. This process requires a treatment facility of the scope previously described and the commitment of approximately 1 acre of land as a plant site. It would be contrary to PL 97-232 to deny use of 1 acre as a plant site when virtually the entire landfill has been designated as a potential wellfield for gas extraction. Further, development of the treatment plant outside the NPS boundary would increase costs and disturb undeveloped natural areas adjacent to the landfill. Therefore, the no-action alternative is not feasible.

ALTERNATIVES A, B, C, AND D

GSF/MDC identified three alternative sites outside NPS boundaries (A, B, and C) and two sites within those boundaries (D and E). The three sites outside had attendant problems, and each failed to meet one or more of the selection criteria. Sites C and D, the latter located on the Pennsylvania Avenue landfill, were immediately rejected because of the presence of unstable fill material and intervening tidal creeks. Site A is too far north of the landfill to be economically feasible because of the large diameter vacuum pipe needed from the wellfield to the plant. Site B, north of the landfill and the Belt Parkway, presents serious access problems for piping and would visually impact the surrounding area. Site E is the only site to meet all selection criteria and is preferred by GSF/MDC.

ALTERNATIVE E

Site E is just south of the existing truck scales near the proposed public use area and the NPS and GSF/MDC access route through the Fountain Avenue underpass. It is 10 to 12 feet above mean high tide and is underlain by stabilized fill; no refuse has been deposited in the area. The site is above the 100-year flood level of 9.4 feet and is not within a coastal high hazard zone as defined by the New York State "Coastal Zone Management Plan." Review of the CZM plan indicates that this project is consistent with the objectives of the plan. A "consistency determination"



TREATMENT PLANT SITE ALTERNATIVES

will be obtained from the state once final site selection is made. No designated wetlands or endangered plant or animal species are known to occur within the NPS boundaries at the landfill (personal communications, U.S. Fish and Wildlife Service and N.Y. Department of Environmental Conservation). No historic structures are on or near the site.

No known local (borough, city, or county) regulations, zoning, or land use plans preclude use of the site for the treatment plant. Local permits will be required as listed in appendix D. Permits will also be required for construction of the distribution line from the NPS boundary to the consumer. GSF/MDC will be responsible for securing these permits, and the city will be responsible for inspections and enforcement of regulations and codes.

The National Park Service agrees that site E is preferable.

ALTERNATIVE F

An alternative to site E is the site of the existing administrative offices adjacent to the Belt Parkway and just west of the Fountain Avenue access entrance. The conditions described for site E are the same for site F, except that the elevation is slightly lower (8-10 feet above mean high tide). Site F offers an advantage to site E in that it would confine development to the immediate area of the Belt Parkway and Fountain Avenue access to the landfill. If site F was selected, site E would be revegetated to provide an unencumbered view of the Spring Creek perimeter.

The primary disadvantage of site F is its location within the 100-year floodplain. In addition, the site is currently occupied by the administrative offices of the Department of Sanitation, at least through 1985, and possibly through 1987. It seems impractical to relocate those offices several months to two years before demolition in order to vacate the site for plant construction.

ENVIRONMENTAL IMPACTS

Jamaica Bay is a large saltwater estuary (approximately 9,000 acres) with numerous islands and marshes. Two man-made freshwater ponds form the core of a bird sanctuary, which is used by migratory species as well as summer resident birds. Most of the undeveloped Jamaica Bay area is managed by the U.S. Fish and Wildlife Service as the Jamaica Bay National Wildlife Refuge. The landfills are on the north shore overlooking the bay. Therefore, activities on the landfills can have a direct impact on the bay and its wildlife.

GENERAL IMPACTS

The following environmental impacts of the treatment plant will be the same for either site selected. Site-related impacts are discussed at the end of this section.

Air Quality*

The plant will be designed as a closed system with safeguards to avoid release of landfill gas to the atmosphere. There will be two air emission points from the plant, both equivalent to the exhaust from a natural gas-fueled vehicle. The first will be from engines used to drive plant compressors, fueled with landfill gas. The second will be from a small incinerator used in the plant gas treatment system. This incinerator will also utilize landfill gas, but will have no visible flame. Emissions from both of these points will be of the same character as the boiler exhaust emissions from the Starrett City central power facility when operating on natural gas, but will be infinitesimal in comparative magnitude.

Gas recovered from the landfill and converted to useful energy will reduce, by a corresponding amount, emissions from the landfill proper. Without recovery, all gas generated by the anaerobic decomposition of the refuse will be emitted into the atmosphere. Accordingly, the proposed recovery plant will serve to reduce emissions and the associated problems by at least 50 percent.

Odor

As explained above, the facility will fully contain the landfill gas being processed, except for two emission points. The two emission points described are exhaust points for flue gas, consisting of normal combustion products of landfill gas and having no odor. Because of the Selexol and iron sponge scrubbing process (described in appendix B), no odors will be generated by the plant. The true source of any odors is the landfill itself, and these odors would be emitted even if the plant was not present. The conclusion, therefore, is that odors from the landfill will be reduced to the extent that the GSF/MDC facility extracts gas from the landfill.

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*See also "Construction Impacts."

Noise

Plant noise will be minimal because compression equipment will be housed in a compressor building. Additionally, there are broad buffer zones around the plant--the landfill on the west, the parkway on the north, and tidelands of Jamaica Bay on the south and east. The decibel sound level is expected to be approximately 50 or less at a distance of about 100 feet from the plant and barely detectable at 100 yards. The noise level of the plant during operation will be less than that of traffic on the Belt Parkway during normal hours.

Aesthetics

The plant will have a low profile, with building and structure heights of about 30 to 35 feet. Plant boundaries will be fenced for security.

Equipment and buildings will be painted in eye-pleasing colors. Unpaved areas within the plant site will be covered with limestone rock. Appropriate landscaping and tree planting will be provided to present an attractive overall view. The plant is completely shielded by the landfill on the west and will be barely visible from the parkway. An artists's rendition is shown on the following page.

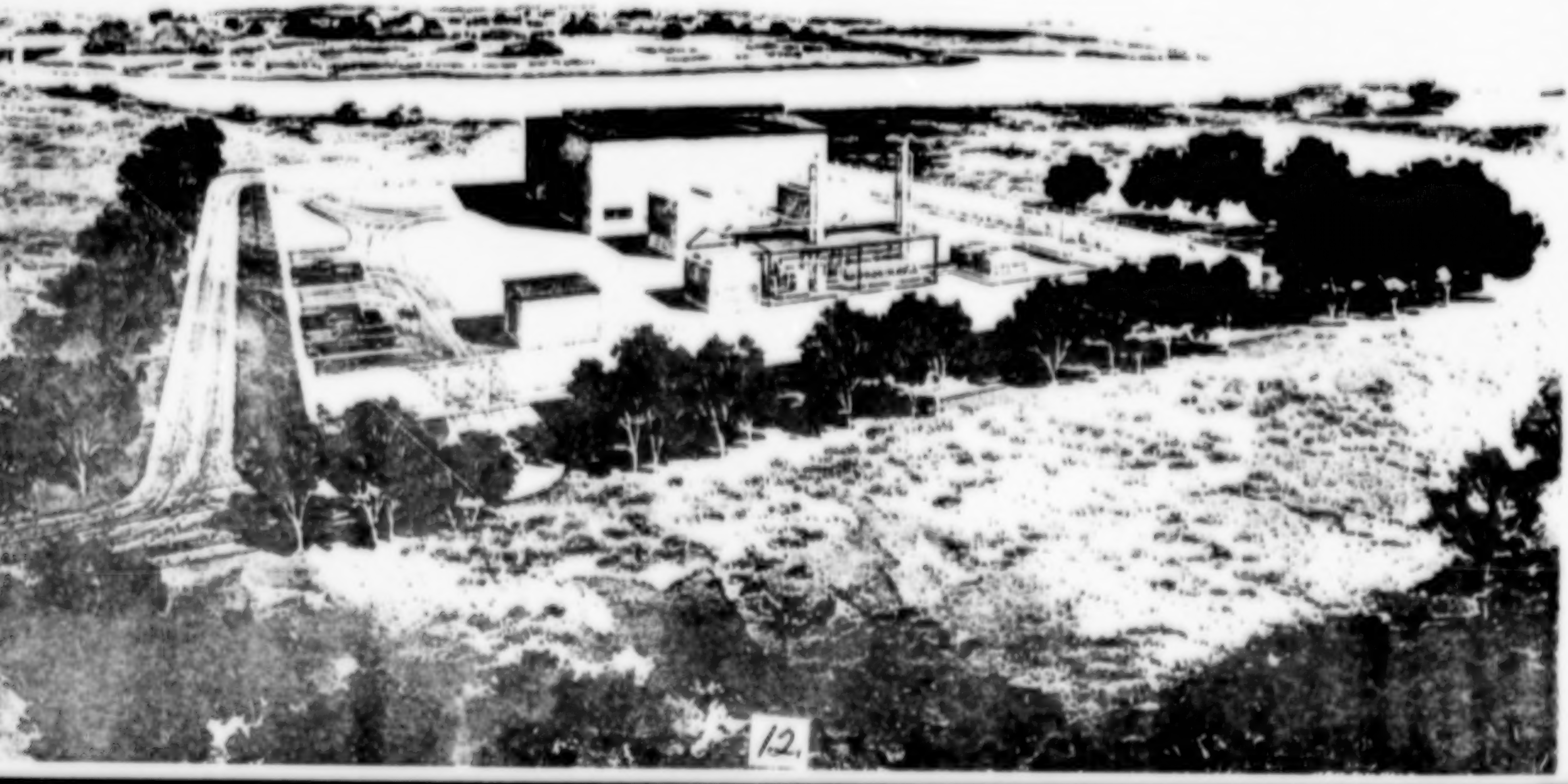
Liquid Disposal

Two liquid streams will be generated by the plant as by-products of the compression and treatment systems. The first, representing more than 90 percent of the total, is water condensate resulting from compression and gas dehydration. The second is comprised of a variety of hydrocarbons removed during treatment. Facilities for separation will be included to provide a water stream suitable for sewering or for return to the landfill and a hydrocarbon stream for off-site disposal. The combined volume of these by-product streams will be quite small, roughly 600 gallons per day. Disposal will be in accordance with applicable laws and regulations.

Wayside Exhibit

Although plans are not yet available for the development of the Fountain Avenue landfill as part of Gateway National Recreation Area, GSF/MDC understands the Park Service mandate to utilize it for recreational activity after closure. It is proposed to build a wayside exhibit (designated "visitor's center" in the GSF/MDC report) at some location mutually acceptable to the Park Service and the developers in order to inform and educate visitors about the methane plant. Appropriate displays will illustrate how methane is generated by the decomposition of refuse. Also, the step-by-step process--how gas is recovered, processed, and delivered--will be explained. A full description of the environmental

Artist's Concept of Treatment Plant at Site E, from "Fountain Avenue Scope of Project" (GSF/MDC 1984)



safeguards employed at the facility will be presented. On the following page is an artist's rendition of the type of wayside exhibit currently planned.

CONSTRUCTION IMPACTS

Construction impacts for a project of the scale of the proposed treatment plant would normally go largely unnoticed in relation to the much larger scale road improvement projects underway in the vicinity. There exists, however, the potential for fugitive dust and stormwater runoff from the construction area to be more hazardous than that from projects not associated with a landfill. Since the construction area is not a deposition area, soils will be clean fill. Soils in the construction area have been tested for contaminants and hazardous materials resulting from leaching of the landfills, and none have been found.

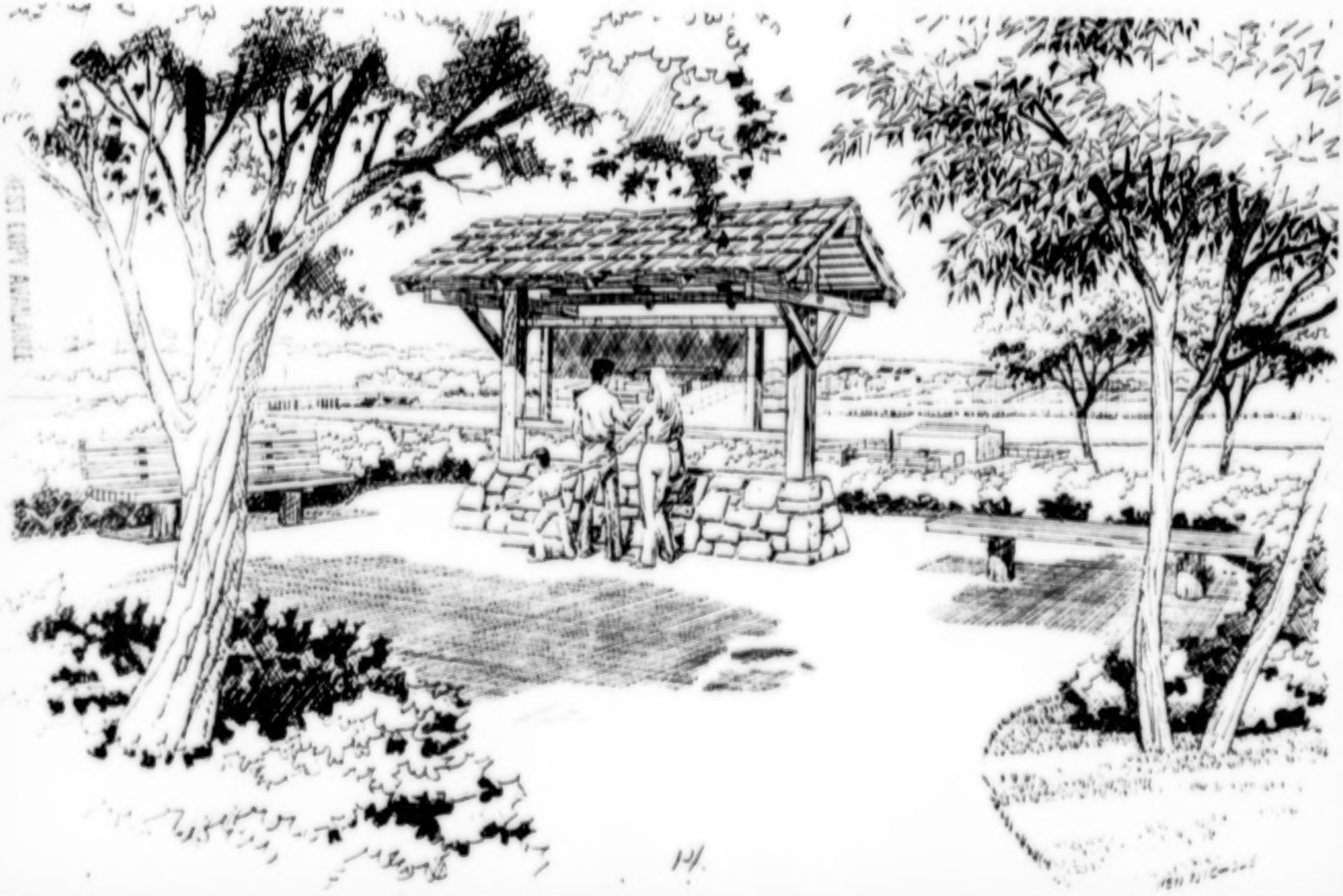
Dust and runoff will be controlled during construction according to the New York City construction code, probably by watering. If contaminants are present, the contractor will follow control measures prescribed by the U.S. Environmental Protection Agency and Public Health Service and/or New York Department of Environmental Conservation in order to ensure the safety of the surrounding public and construction workers and prevent degradation of the local environment.

SITE DIFFERENCES

Construction of the treatment plant at site E will somewhat compromise the natural estuarine scene to the northeast of the site. Visitors will see the plant for several hundred yards on their trek from the parking lot to the interior.

Construction at site F will confine the impacts of development to an area adjacent to the Belt Parkway. Views to the south will be of a natural setting as visitors leave the developed area and follow trails ascending the heights of the landfill. Construction on the site will, however, require additional fill or berming to essentially raise the area above the 100-year flood level of 9.4 feet. The filling will have to be done in this area regardless of the site selected in order to protect the access route and parking lot from a 100-year flood.

Artists Concept of Wayside Exhibit, ("Visitor's Center") from "Fountain Avenue Scope of Project" (GSF/MDC 1984)



PERSONS AND AGENCIES CONSULTED

U.S. Department of the Interior, Fish and Wildlife Service
U.S. Environmental Protection Agency
U.S. Department of Transportation, Federal Aviation Administration
New York State Coastal Zone Management Agency
New York State Department of Environmental Conservation
New York City Department of Ports and Terminals
New York City Department of Sanitation
Community Board 18
Starrett City Community Association
Starrett City Administration
Getty Synthetic Fuels, Inc.
Methane Development Corporation
Audubon Society
Sierra Club
Congressman Charles Schumer
Congressman Joseph Addabbo

APPENDIXES

- A: PL 97-232
- B: PROCESS DESCRIPTION (GSF/MDC)
- C: TEST WELL GAS ANALYSIS
- D: PERMIT REQUIREMENTS

APPENDIX A: PL 97-232

Public Law 97-232
97th Congress

An Act

To provide for the development and improvement of the recreation facilities and programs of Gateway National Recreation Area through the use of funds obtained from the development of methane gas resources within the Fountain Avenue Landfill site by the city of New York.

Aug. 9, 1982
[S. 2218]

Gateway National Recreation Area, improvement.
16 USC 460cc-2.
Fountain Avenue Landfill site.
Conveyance rights.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section 3 of Public Law 92-592 is amended by adding at the end thereof the following new subsection:

"(i) Notwithstanding the provisions of subsection (a) of this section, the United States hereby conveys to the city of New York all rights to the methane gas and associated byproducts resulting from solid waste decomposition on the area within the Jamaica Bay Unit known as the Fountain Avenue Landfill site, subject to payments to the United States of 50 per centum of the revenue received by the city of New York, if any, from the development of such rights. The Secretary shall grant to the City, its lessee or assignee, all rights-of-way and other permits necessary from the Department of the Interior to extract and transport the gas from the site: *Provided,* That the rights-of-way and other permits shall provide for reasonable restoration of the site, including removal of any processing or storage facilities used in the disposal, development, or extraction of the gas, access by the Secretary to the site for safety and other recreation area purposes, and such other reasonable conditions as the Secretary deems necessary to further purposes of the recreation area. All such payments to the United States shall be credited to the appropriations of the National Park Service for the development and improvement of Gateway National Recreation Area.".

Funding.

SEC. 2. Subsection 4(a) of the Act of October 27, 1972 (86 Stat. 1308), is amended by changing "ten years" in the second sentence to "twenty years".

16 USC 460cc-3.

Approved August 9, 1982.

LEGISLATIVE HISTORY—S. 2218:

HOUSE REPORT No. 97-677 (Comm. on Interior and Insular Affairs).
SENATE REPORT No. 97-455 (Comm. on Energy and Natural Resources).
CONGRESSIONAL RECORD, Vol. 128 (1982):
    June 9, considered and passed Senate.
    Aug. 2, considered and passed House.

APPENDIX B: PROCESS DESCRIPTION (from GSF, 7/23/84)

The Fountain Avenue Landfill well and collection header system will be sized to transport 6.3 MMSCFD of recovered landfill gas to the plant. Landfill gas enters the plant through the inlet separator where entrained liquids, primarily water, are separated from the gas before further processing, and the water is disposed of into an industrial sewer.

The landfill gas is routed into two identical gas engine driven reciprocating compressors for compression to approximately 150 psia in two stages. The gas-engine drivers are rated at approximately 650-hp each. The gas compressor is a packaged unit complete on a structural steel base or skid with air-cooled intercooler/aftercooler units. Interstage/afterstage scrubbers are provided to collect condensibles accumulated as a result of cooling the gas. These condensibles, predominantly water and some hydrocarbons, are routed to a phase separator for separation of the hydrocarbons and water. The liquid hydrocarbons are sold separately while the water layer is routed to the nearest sewer.

The compressed landfill gas at 150 psia then enters the gas treatment system. The purpose of the gas treatment system is to reduce the concentration of non-methane hydrocarbons, and hydrogen sulfide to a level suitable for sales gas purposes. This is accomplished by gas chilling and absorption processes.

The gas if first cooled by back exchange with the chilled gas and condensed water is removed in a knockout drum. The gas then is passed through an iron sponge bed to remove H_2S and other sulfur compounds. The removal of sulfur compounds from landfill gas serves to insure that pipeline gas quality specifications are met (less than 4 ppmV of hydrogen sulfide). The sulfur content of landfill gas leaving the iron sponge bed will typically be about 0.5 to 1.0 ppmV. The iron sponge bed is non-regenerative and must be replaced every six months to one year, depending upon the inlet level of hydrogen sulfide found. The discarded iron sponge material (wood chips initially impregnated with iron oxide which is converted ferrous sulfide) is landfilled as a safe and environmentally acceptable disposal method.

The primary gas chilling is accomplished with a gas chiller utilizing chilled water as the refrigerant. The chilled water refrigeration system consists of a freon-based standard refrigeration compressor/condenser unit complete with electric motor driver, circulation pump, and controls. After the absorption step, the gas is warmed by back exchange with the inlet gas and routed to the sales gas delivery pipeline.

The chilled landfill gas at 10°F is routed through an absorption column which uses the solvent Selexol to selectively absorb the non-methane hydrocarbons to a sales gas quality specification of less than 5 ppmV benzene and less than 5 ppmV total chlorocarbons. The gas leaving the absorber column is warmed by the inlet gas and then sold into the sales gas pipeline. The rich Selexol solvent is then regenerated for re-use in the absorber column. A stripping column is utilized which strips the non-methane hydrocarbons from the Selexol by countercurrent contact with air. Both the air and Selexol are preheated before entering the column. The regenerated Selexol is then pumped back to the absorber tower. The contaminated air effluent from the stripper column is routed to an incinerator for destruction of all non-methane hydrocarbons [refer to appendix C for an analysis of the gas components]. The incinerator burner and combustion chamber has been designed to maintain 1600°F firebox temperature at a minimum 0.5 seconds residence time. These values are consistent with data and criteria set by regulatory agencies for the destruction of vinyl chloride. A minimum 99% destruction efficiency for vinyl chloride is expected. Consistent with the high excess air requirements for this type of incinerator, essentially complete destruction of all other non-methane hydrocarbons is expected. . . .

APPENDIX C: TEST WELL GAS ANALYSIS (From GSF, 7/23/84)

	Inlet Gas			Sales Gas	% Removal
COMPONENT	Header No. 1 (Vol. %)	Header No. 2 (Vol. %)	Weighted Avg.* (Vol. %)	(Vol. %)	
Hydrogen	0.05	0.50	0.19	0.19	-
Carbon Dioxide	40.78	43.25	41.55	41.57	-
Oxygen	0.05	0.10	0.06	0.06	-
Nitrogen	1.10	1.20	1.13	1.13	-
Methane	57.96	54.83	56.99	57.03	-
Non-Methane Hydrocarbons:	(Vol. ppm)	(Vol. ppm)	(Vcl. ppm)	(Vol. ppm)	
Paraffin					
C_2	82	69	78	78	0
C_3	20	56	31	30	3
C_4	45	50	47	38	19
C_5	7	20	11	4	64
C_6	-	-	-	-	-
C_7	6	17	9	1	89
C_8	21	57	32	1	97
C_9	33	106	56	-	99
C_{10}	28	191	79	-	100
Halogenated					
Freon 11	2	1	2	-	92
Freon 12	10	11	10	-	92
Freon 21	1	3	2	-	92
Freon 22	5	5	5	-	95
Freon 114	1	2	1	-	98
Chloroethene	37	10	29	2	93
Dichloromethane	8	18	11	-	99
Dichloroethene	30	47	35	-	99
Dichloroethane	1	4	2	-	98
Trichloroethene	5	20	10	-	99
Tetrachloroethene	34	84	50	-	100
Aromatic					
Benzene	5	20	10	1	90
Toluene	117	116	117	6	95
Xylenes	4	19	9	-	98
Ethyl Benzene	2	11	5	-	97
Oxygenated					
Oxygenated Hydrocarbons	5	152	51	1	98

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*Weighted average based on 69% flow from Header No. 1, 31% from Header No. 2.

Gas samples for analysis were obained at the time landfill tests were conducted for the purpose of determining the amount of gas available. Several test wells were installed and manifolded into one of two headers. The above results are from samples taken from the two headers. Samples are often held for later analysis pending a determination of interest in proceeding with the project.

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APPENDIX D: PERMIT REQUIREMENTS
(From GSF/MDC "Fountain Avenue Scope of Project," 4/84)

The following is considered to be the basic Permit requirements for the development of the Fountain Avenue facility. Delays in project completion due to permitting are not foreseen at this point in time.

I. Building and Operating Permits

Using the Fresh Kills facility as a precedent. The following Permits will be required.

A. Agency--New York State Department of Environmental Conservation

1. Permit--Solid Waste (Part 360)
2. Permit--Air Quality (Part 201)
3. Permit--Pollution Discharge Elimination (Permits 750-757)

B. Agency--City of New York Department of Ports and Terminals

1. Permit--Drilling of Test Wells and Test Borings
2. Permit--Foundation and Piles
3. Permit--Site Preparation
4. Permit--Equipment Installation
5. Permit--Electrical Work
6. Permit--Gas Collection System and Wells
7. Permit--Building (Control House, etc.)
8. Permit--Fire Protection
9. Permit--Steel Framing
10. Permit--Plant Operations

C. Agency--City of New York Department of Environmental Protection

1. Permit--Exhaust, Ventilation of Atmosphere Stack Test
2. Permit--Water
3. Permit--Construction

D. Agency--Fire Department

1. Permit--Piping, Equipment and Hydrant System
2. Permit--Occupancy
3. Permit--Pressure Vessels

E. Agency--U.S. Department of Transportation, Federal Aviation Administration

Depending on the geographical location and general configuration of the plant, there could be a requirement to file F.A.A. form 7460--"Notice of proposed construction or alteration."

II. Environmental

Agency--New York State Department of Environmental Conservation (NYSDEC)

A negative declaration of determination of no environmental significance was issued by the NYSDEC for the Fresh Kills project. . . . [The Fountain Avenue Recovery Project will need to undergo similar NYSDEC review.] It is, therefore, reasonable to anticipate that the Agency will follow the Fresh Kills precedent and issue a negative declaration requiring no environmental impact report for the Fountain Avenue facility.

Note: A permit for discharge of fractions of the landfill gas condensate to the city sanitary sewer system will also be required by the City of New York Department of Sanitation.

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